

Introduction to Public Policy

Lecture Note 7

The Division of Labor, Specialization and Trade

In macroeconomics class we have already discussed the importance of specialization and the division of labor to economic growth. Today we will see that the process has not come to an end, and that specialization and the division of labor continues to shape our economies. It also has important implications for governments and policy makers in industrialized and developing countries.

You will recall Angus Maddison's estimates of GDP per capita over the long period of history. For most of human history very little happened in economic terms. In fact, for most of the period of the common era income per person was *less* than it was during that achieved during the heyday of the Roman Empire! Estimates of this sort can never be exact, but even allowing for some error it is clear that after 1500 the growth of average income began to take off in Europe, and that by the 19th century the entire world was experiencing rapid economic growth, in most places for the first time.

Adam Smith lived and wrote at a time when this transition was well underway but no one else had as clear an understanding of its causes and importance. Smith, in *The Wealth of Nations* (1776), identified the division of labor as the main source of productivity growth. This happens in three ways. First, when workers do one thing over and over again they become very adept at performing the task, which they perform faster and more accurately. Second, workers save time if they do not have to shift from one activity to another. Third, dividing production into discrete tasks induces technical progress.

Specialization and the division of labor, and the mechanization of production that results from it, generate increasing returns to scale. Where once small workshops dominated manufacturing, now production takes place for the most part in large and highly mechanized production facilities. Moreover, for many manufactured goods production has become concentrated in the hands of a small number of mega-producers. Where once there were hundreds of independent automobile assembling companies, now there are about seven in the entire world! Economies of scale apply not only to production, but also to research, marketing, supply chain management and finance.

The main point that I would like to discuss today is that specialization and the division of labor are not just of historical interest. They are the main motivating force behind the current wave of globalization that began around 1980. Globalization has transformed

that way that companies make manufactured goods, farmers produce and sell commodities, and firms of all kinds deliver services. It has also changed the goals and mechanisms of economic policy.

Let's look at changes in the production of electronic consumer goods as an example. Falling tariffs under the General Agreement on Tariffs and Trade (GATT) and later the World Trade Organization (WTO) came at the same time as the computer revolution. Because of the trade agreements, it became cheaper for companies to produce components in far-flung locations and then bring them together for final assembly. This process was also aided by digitization. Computer aided design and the internet made it easy and cheap for companies to send specifications for components to manufacturers on the other side of the world. So rather than relying on suppliers close to home (so that engineers could meet together to share designs) manufacturers began using suppliers from other countries. This meant greater specialization, and more competition, which in turn delivered cheaper products for consumers.

Let's take as an example the Apple iPod circa 2005 (following Linden, Kraemer and Dedrick 2007). The iPod has about 450 parts, most of which are not made by Apple. Apple designed the iPod, developed the software and distributes it through its own retail chain (as well as through other shops). The rest of the product is made by literally hundreds of different companies, all of which send their components to a Taiwanese company based in China for final assembly (Apple does not assemble the iPod).

The most expensive component in the iPod is the hard drive, which in 2005 was produced by a Japanese contract manufacturer (Toshiba) in China. The display module, made in Japan by a Japanese joint venture contract manufacturer (Toshiba-Matsushita), was the second most expensive component. Neither of these components was new or high-tech, which meant that competition from other suppliers kept profits low. The microchip that controls the iPod's functionality was produced in the US or Taiwan by PortalPlayer, an American "original design manufacturer." PortalPlayer could not drive up profits because of the company's dependence on Apple, which in 2005 accounted for 93 percent of its sales. Indeed, when Apple switched suppliers the following year PortalPlayer suffered a huge drop in revenue and was eventually acquired by a larger chip producer. This illustrates an important point about modularity: it can be extremely lucrative for companies to make components, but very risky, as buyers seek to drive down costs by creating competition among suppliers.

The video/multimedia processor was made in Taiwan or Singapore by Broadcom, a major US original design manufacturer. Hundreds of other less expensive parts and components were made in Japan, Korea and China by a range of suppliers and contract manufacturers. Final assembly was carried out in China by a Taiwanese company (Inventec).

The Ipod example demonstrates the pressure on original design manufacturers and contract manufacturers to achieve economies of scale and to invest in R&D at every level of the supply chain. Second and even third tier producers are not small companies: they are also large multinational companies that are engaged in product and process design and maintain their own supply chains, largely in Asia. New manufacturers must enter this system at the bottom, beginning with generic materials supplies and moving up into higher level components as technological and managerial capacity develops.

The apex is the most lucrative position in the supply chain. Apple makes the largest gross margins from the Ipod from its retail and distribution network. People are willing to pay a premium for the product because of the brand, the design and the software, all of which is under Apple's control. But Apple must continually redesign and relaunch its products as its competitors copy older models and offer the same design features at a lower price, or add their own attractive features to persuade Apple customers to switch brand loyalties. Failure to innovate would certainly result in nearly immediate loss of market share and perhaps worse.

Even relatively low-tech, labor intensive sectors are not free from these pressures. Athletic footwear companies like Nike compete with each other by expanding the array of styles on offer and by rotating products in ever shorter seasonal cycles. They force contract manufacturers to compete with each other in reducing production times and improving quality. For example, Taiwanese contractors operating in China reduced the time required to produce a pair of shoes from 25 days to ten hours over the period 2002 to 2006.

Globalization, specialization and the division of labor presents developing countries with opportunities to break into new parts, component and assembly industries that were previously dominated by advanced countries. Multinational companies are willing to share designs and technology and involve suppliers in the development of new products and processes if this helps them to reduce costs or increase the pace of innovation. But to gain access to these opportunities firms must survive cutthroat competition involving numerous contenders from around the world. Cheap labor provides some advantages, but hardly enough to guarantee survival: on average, labor costs make up three to four percent of the FOB price of products shipped from the developing world to the United States, and 0.75 percent of the retail price. No wonder management consultants agree that cheap labor strategies are always a dead end.

For example, the direct labor costs of an Ipad were approximately 6.6% of the retail price of \$499 in 2011. Only 1.5% of this was in final assembly. Foxconn, a Taiwanese company that assembles the Ipad in China, has come under pressure from labor rights groups after a string of suicides in its Shenzhen manufacturing facility. Foxconn says it has increased wages, but it also faces pressure from Apple to continually reduce costs.

Foxconn says that its strategy is to mechanize production to reduce the wage bill even further.

Pressure at every stage of the supply chain means that first and even second tier suppliers must invest massively in R&D to avoid loss of markets. Apple, and other “systems integrators” continually insist on new features, higher quality and cheaper prices from their suppliers. The only way to meet these demands is to invest in research. For example, Apple’s main suppliers for the Iphone all invest heavily in R&D to try to remain at the technological frontier, and hence a supplier of Apple.

The development of technological and managerial capabilities is the key to surviving the global business revolution. Some of these capabilities can be acquired locally the old fashioned way: learning by doing, reverse engineering and hiring experience workers from other firms. But in most cases the processes are too advanced, and learning times too truncated, to succeed using these methods. The best hope for developing country firms in many product lines is to develop strong linkages with multinational enterprises that have an interest in cultivating capabilities amongst their supplier firms.

Specialization, the division of labor and economies of scale are the main drivers behind productivity growth and high living standards. This fact has important policy implications. It does not mean that small businesses are unimportant since as many of tomorrow’s large companies are today’s small and medium scale firms. But it does mean that policy must make it possible for firms to specialize, to trade and to gain access to overseas markets. Education and research are essential to firms and hence national development. What other policy implications can you think of?